Cholecystography

As An Aid In The Diagnosis Of Gall-Bladder Disease:

With Special Reference To The Administration Of

Sodium Tetraiodophenolphthalein By The Oral Method.

A Thesis

presented for the degree of M.D.

by

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As an aid in the diagnosis of Gall-Bladder disease: With special reference to the administration of Sodium Tetraiodophenolphthalein by the Oral Method.

During the last four years a great deal of work has been done on Cholecystography, and it has now come to be recognised as one of the great recent advances in the diagnosis of Gall-bladder disease. It must be emphasised, however, that a diagnosis should never be made on radiographic evidence alone, without taking into consideration the history and clinical findings.

In this Thesis an attempt is made to show that, if the technique is carried out properly, the oral administration of Sodium Tetraiodophenolphthalein gives fairly accurate results. No attempt is made to compare the oral and the intravenous methods.

The investigations have all been carried out at the North Middlesex Hospital, London N.18, during the past 18 months. The writer has studied all the cases mentioned and has supervised the administration of the dye.

A series of seventy cases was investigated and X-rayed after the oral administration of Sodium Tetraiodophenolphthalein; Fifty cases of this series were operated upon and as this forms an important group, the main facts in the histories and findings are recorded.

As economy had to be considered, only three X-ray photographs were taken of each patient.

The material which follows is arranged under the following main headings:-

1. Historical Survey.
2. The Physiology of the Gall-Bladder.
3. The oral administration of Sodium Tetraiodophenolphthalein.
4. Writer's case records - 50 cases operated upon.
5. Summary and Conclusions.
6. X-ray photographic prints.
7. Bibliography.

At this stage the writer wishes to express his sincere thanks to Lt.Colonel Spencer Mort, M.D. Ch.M. F.R.C.S., F.R.S.(Edin) Medical Superintendent, and Surgical Director of the Hospital, for his kindness

in permitting the case records to be published and to Mr. R.K. Galloway M.B., F.R.C.S.E., Assistant Surgeon, who performed all the operations and allowed many of his cases to be investigated.

1. Historical Survey.

It was in Feb. 1924 that Graham and Cole [1] recorded their important discovery, that the Gall-bladder could be visualised on X-ray examination, after the intravenous injection of an opaque dye, - Tetrabromphenolphthalein. It occurred to them that, as in the past, the administration of an opaque meal ~~had~~ had revolutionised the diagnosis of Gastro-intestinal conditions, so the introduction of an opaque substance into the Gall-bladder would make clear, after X-ray examination, pathological conditions of that organ.

A radio opaque dye had to be produced which, when introduced into the blood stream, would be excreted into the bile. It also had to be non-toxic. Previous investigations in pharmacological research by Abel and Rowntree, [2] brought to notice the important discovery that Phenolchlorphthalein, after intravenous injection, was excreted into the bile. Later Rosenthal [3] introduced a method by which it was possible to prove the practical value of this dye in liver-function tests. This important discovery suggested to Graham and his

co-workers, the nature of the dye to be used.

In their first paper on Cholecystography, Graham and Cole[1] mention that they first used Tetraiodophenolphthalein, which produced Gall-bladder shadows, but it was found to be too toxic for use in man. They next used Sodium Tetrabromphenolphthalein and found it satisfactory as regards toxicity, but unsatisfactory as regards the production of clear shadows of the Gall-bladder. They then decided to try the Calcium Salt instead of the Sodium Salt of Tetrabromphenolphthalein. This substance was found to produce clear-cut shadows when introduced intravenously, both in experimental animals, and in man.

The dose of Tetrabromphenolphthalein used was ·1 gm. per kilo. of body weight, with a maximum dose of 6 gm., mixed with 1·2 gm. Calcium hydroxide and dissolved in 325-350 c.c. distilled water. The addition of 2 gm. Calcium lactate in a few c.cms of water made a more soluble solution.

The solution was sterilised, filtred and given intravenously; the injection taking 20-30 minutes to complete. The Gall-bladder was X-rayed at intervals

of several hours, commencing 3 hours after injection.

At this early stage, these workers state that shadows were produced in all cases and suggest that if no shadow is seen, the Gall-bladder is pathological.

Later, Graham, Cole and Capher[4] abandoned the use of the Calcium Salt in favour of the Sodium Salt, stating that owing to its relative insolubility, much more fluid had to be injected and the toxic effects - dizziness, headache, nausea and vomiting - were more marked than with the more soluble Sodium Salt. The poor results previously obtained by them with the Sodium Salt, were due to faulty technique.

Four to seven hours after the injection of this dye a faint shadow should appear which is larger than the Gall-bladder found at operation. At the end of 24 hrs. the shadow is more distinct, but only one half the size of the first. From then to the 48th hour, the shadow diminishes in size and fades.

In a paper published in Feb. 1925, Graham, Cole and Capher[5] announced the success obtained by the use of Sodium Tetrabromphenolphthalein in Cholecystography. In a series of 55 cases, only 13 experienced unpleasant

sensations - dizziness or nausea. About 7% had nausea, vomiting, and body pains, which only lasted a few hours. They state that a correct diagnosis was obtained in 95% of cases of Cholecystitis, with or without stone, verified at operation and pathologically.

Their work was not only an impetus to diagnostic study but also proved that it was possible to study the physiological function of the Gall-bladder and its ducts, by their method.

Graham and Cole[1] in their early investigations used Sodium Tetraiodophenolphthalein for Cholecystography, but soon abandoned its use as it proved to be too toxic in man. In a very admirable paper, Whitaker and Milliken[6] compare Sodium Tetrabromphenolphthalein and Sodium Tetraiodophenolphthalein in Gall-bladder radiography. They state - "Elements are opaque to X-rays approximately in proportion to their atomic weight. The atomic weight of Bromine is 80, while that of Iodine is 127. Sod. Tetraiodophenolphthalein contains 59% of Iodine; Sod. Tetrabromphenolphthalein contains 47% of Bromine. The ratio of the opacity of the bromine salt is to the Iodine salt roughly as

1 : 2. Experimentally, on dogs, it was found that nearly three times as much was required of the Bromine salt as of the Iodine salt, to produce equal shadows. Even with a large amount of the Bromine salt we were able to get shadows in the dog only in 19% of cases, as compared with 80% when the Iodine salt was injected."

They concluded that in man denser shadows were produced when the Iodine salt was used. The dose required was much smaller and there was no appreciable difference in toxicity of the two salts.

In a later paper Graham, Cole and Capher[7] attribute the toxic symptoms produced in their first experiments with Sodium Tetraiodophenolphthalein to an impurity of the drug used and state that they now agree with Whitaker and Milliken that the purified sample of Sodium Tetraiodophenolphthalein is no more toxic than the Bromine preparation. With a dose of 3 - 3·5 gms. for patients weighing 130 lbs. or over, shadows were produced which were as satisfactory as those produced by the Tetrabromphenolphthalein preparation. They therefore advise the future use of Sodium Tetraiodophenolphthalein for intravenous administration.

Cohen and Roberts[8] found that the intravenous injection of Sod. Tetrabromphenolphthalein occasionally gave rise to severe reactions - pains in back, giddiness, nausea, vomiting, cyanosis and a feeling of coldness all over the body.

Wilkie and Illingworth[9] report favourably on the intravenous injection of Sod. Tetraiodophenolphthalein and record 53 cases X-rayed prior to an operation in the abdomen. They state that Cholecystography is a valuable aid in the diagnosis of Gall-bladder disease and that if the Gall-bladder shadow is visible and is normal in contour and density then gross disease of that organ may be excluded.

The intravenous administration of Sod. Tetraiodophenolphthalein has been proved to produce excellent results, but in the hands of some workers severe toxic reactions were produced.

To overcome these the oral method of administering the dye was introduced.

Menees and Robinson[10] first administered Sod. Tetrabromphenolphthalein by the oral method

and later Whitaker, Milliken and Vogt[11] advised the oral administration of Sod. Tetraiodophenolphthalein. They gave 3·5 - 6·5 gms. as a dose, in pills, doubly coated with Salol and Syrup of Tolu, which passed through the stomach, thus avoiding gastric irritation. The pills were given at 8 p.m. after a light supper of bread, butter, milk and water. No food was given the next morning and X-ray photographs were taken at 12 and 15 hours after the dye was administered. A fatty meal was then given and a third X-ray photograph taken 1 hour after this. They report Gall-bladder shadows present in 93% of normal people. Out of 44 cases, 27 exhibited no toxic symptoms; 5 vomited 1-3 hours after; 5 had diarrhoea and 7 had nausea.

This new method of administering the dye shows a definite advance in Cholecystography. The technique is simple, it produces very little discomfort to the patient, the toxic effects are mild and if the results prove to be satisfactory, it should ultimately become the method of choice.

Graham, Cole and Capher,[12] in a paper to the Journal of the American Medical Association, 1925,

say, "We now continue the oral administration of Sod. Tetraiodophenolphthalein with increasing satisfaction." They still, however, believe the intravenous method to be the better and advise confirmation by the intravenous administration of the dye in all cases which are negative orally. Carman,[13] working at the Mayo Clinic, reports 800 cases X-rayed after the giving of Sod. Tetrabromphenolphthalein orally. Sod. Tetraiodophenolphthalein was also used orally in a number of cases, but the number was not sufficient to give a definite opinion on the results. He states that toxic disturbances occurred more often after Sod. Tetraiodophenolphthalein than after Sod. Tetrabromphenolphthalein, and that the shadows produced were less dense than when these drugs were given intravenously. Using Sod. Tetraiodophenolphthalein orally, Lange[14] states that he performed the test in 500 routine X-ray abdominal examinations. In the last 200 cases he obtained distinct shadows in 90% of the normal cases. Of these cases reported normal, and which later were

operated upon, he noted no errors, although only a small percentage had been checked by operation. A certain number of cases showing no shadow, and diagnosed pathological, were also checked by operation, and only one error was noted. Camp, Reeves and Field[15] report 33 cases examined by the oral method, showing no shadow on X-ray, and diagnosed as Cholecystitis. Of these, 30 were confirmed by the surgeon, thus producing 88% net accuracy.

Stewart and Ryan[16] introduced the Jejunal administration of Sod. Tetraiodophenolphthalein through the duodenal tube, with good results, but later adopted the oral method as being more simple. In a series of 100 cases where the dye was given orally by Brams, Meyer and Brams,[17] 34 showed excellent Gall-bladder shadows on X-ray examination and 66 showed no shadow. Twenty-two of the normal cases were proved at operation.

The gradual development of Cholecystography has aimed at the production of a non-toxic dye and at simplification of the administrative technique. The oral administration of Sod. Tetraiodophenolphthalein fulfils these deciderata.

2. The Physiology of the Gall-Bladder.

The introduction of Cholecystography has greatly aided the physiological study of the Gall-bladder and its ducts.

Normally bile is continuously excreted by the liver, and accumulates in the Gall-bladder during a fasting period. The sphincter of Oddi, at the end of the common bile-duct, prevents the bile from continuously entering the duodenum. During the passage of food-stuffs along the duodenum, the common duct sphincter relaxes and allows bile from the Gall-bladder and liver to pass. Capher, Kadman and Graham,[18] after investigation on the filling and emptying of the Gall-bladder, state "A resistance to the outflow of bile from the common bile-duct is necessary for the collection of bile in the Gall-bladder." They found that this was effected by the Tonus and movement of the duodenum, and that the valves of Hester in the cystic duct do not offer much resistance to the entrance or exit of bile. The vagus and sympathetic nerves control the action of the sphincter of Oddi.

Rous and McMaster[19] first showed that the Gall-bladder, when left to fill with bile, concentrated it 7·1 times in twenty-four hours, by removal of water and inorganic salts. The Gall-bladder therefore

stores up bile and acts as a concentrating organ.

Since the introduction of Cholecystography, many of the physiological facts relating to the Gall-bladder have been definitely proved. In a communication to the Surgical Clinics of North America, Held[20] states: "The most conclusive and painstaking work on the physiology of the Gall-bladder, by means of the dye, was carried out by Sosman, Whitaker and Edson. In order to demonstrate the importance of the action of the sphincter of Oddi, they sewed a tube to the ampulla of Vater in order to make the sphincter incontinent. After the animal fully recovered, the dye was introduced intravenously and only a weak shadow was seen three times and no shadow four times, proving that an intact sphincter is necessary to obtain normal Cholecystograms. The authors likewise demonstrated the importance of the concentrating power of the mucous membrane of the Gall-bladder. They scraped off the Gall-bladder mucosa in a number of dogs and then introduced the dye intravenously. Under such conditions no Gall-bladder shadow was obtained."

A good deal of work has been done on the normal emptying of the Gall-bladder, but differences of opinion still exist amongst investigators. Certain workers maintain that the respiratory mechanism is the main factor. The work of Capher and Illingworth[21]

has shown that the emptying mechanism is dependent partly upon intrinsic muscular action, partly upon its elasticity and partly upon the ebb and flow of fresh bile from the liver. They state that variations in intra-abdominal pressure play a minor role in the emptying of the Gall-bladder. Taylor and Wilson[22] mention that the existence of rhythmic contractions of the Gall-bladder has been known for many years and was first recorded graphically by Doyen in 1893. It is stated by Whitaker[23] that the first person to demonstrate the complete collapse of the Gall-bladder in animals by appropriate foods, was an anatomist - Dr. Boeyden of Harvard Medical School. He showed that a meal rich in fat (egg yolk plus cream) induced the following cycle of change in the Gall-bladder of the cat:

A. A period of slow emptying lasting two hours.

B. A collapsed or resting period lasting five hours.

C. A period of rapid filling and concentration of bile.

He also showed that pure protein (egg white) or carbohydrate (rice) failed to produce any marked diminution in the size of a distended Gall-bladder. Starch and sugar produce no reduction. Hydrochloric acid given by the mouth or by the duodenal tube produces no change. Sodium Bicarbonate given by the mouth causes an increase in density of Gall-bladder shadows, after the

administration of Sodium Tetraiodophenolphthalein. Capher and Illingworth[21] have shown that the response of the Gall-bladder to a fatty meal depends on its absorption through the intestinal wall. It has not been proved whether it is due to nervous or hormonal action. It has now been definitely shown that fat has the greatest effect on the emptying of the Gall-bladder. Certain workers hold that the Gall-bladder empties by absorption of bile by its walls. This has been disproved by Capher,[24] He ligated the cystic duct in animals after the Gall-bladder had been filled with a radiopaque dye and found that even after one week, the dye did not disappear, thus proving that the Gall-bladder normally empties through the cystic duct. It has also been noted that in patients who were seized by common bile duct obstruction after the administration of the Sod. Tetraiodophenolphthalein, the Gall-bladder shadow remained for weeks.

After considering the evolution of Cholecystigraphy and the physiology of the Gall-bladder, a description of the oral administration of Sodium Tetraiodophenolphthalein follows:-

3. The Oral Administration of Sodium Tetraiodophenolphthalein.

Since the introduction of the oral administration of Sodium Tetraiodophenolphthalein by Whitaker, Milliken and Vogt,[11] many workers have found this method to be very reliable.

In the writer's series of cases, Opacin, a proprietary preparation, manufactured by May & Baker of London, was used. It is the pure Sod. Tetraiodophenolphthalein, which is a blue crystalline powder, readily soluble in water, and having the formula $C_{20} H_8 O_{14} I_4 Na_2$. When given in gelatine capsules it passes through the stomach and is absorbed by the intestines. It is then carried by the portal vein to the liver, where it is taken up by the hepatic cells. The dye is excreted in the bile and passes along the hepatic and cystic ducts to the Gall-bladder, where it is stored and concentrated, during a fasting period. After a fatty meal the Gall-bladder is stimulated to empty its contents and the dye finally passes by way of the cystic and common bile ducts to the intestine.

The advantages of the oral methods are, that it can be given with perfect safety, the administration is simple and time-saving, and it can be used in the hospital out-patient department. The disadvantages are that the amount of dye absorbed from the intestine is not known and the rate of absorption is variable.

Levyn and Aaron[25] state, "If the Sodium salt is given directly into the stomach, the acid gastric juice immediately converts the salt to the insoluble free acid. If this free acid passes into the intestine, the alkalinity of the intestinal fluid is not sufficient to convert the free acid into the soluble salt again, therefore the desired results cannot be obtained."

The technique of administration:- The following method of administration has been used in all the writer's cases.

The day previous to the taking of the dye the patient has his bowels well opened, by a purgative such as Liquorice powder. On the day of administration only light meals are allowed, and at 6 p.m. he is given a medium sized meal composed of fat and

carbohydrate, with only a small proportion of protein. At intervals during the meal, 10 gelatine capsules of "Opacin", each containing ·5 grams of the dye, are swallowed, along with plenty of fluid. This is a dose of 5 grams for an adult of average weight (115 lbs - 160 lbs). It is an advantage also to give one drachm of Spdium Bicarbonate before and after the meal. Nothing is allowed by the mouth until after the first X-ray photograph has been taken next morning. The following morning at 9 a.m. the patient has his Gall-bladder region X-rayed, and then is given a meal, consisting of fat bacon, eggs, milk, bread, butter and plenty of fluids. Two hours after this fatty meal a second X-ray photograph is taken; he then resumes his normal mode of living, and at 9 a.m. the next day a third and final X-ray photograph is taken.

As economy had to be considered, only the minimum number of X-ray plates could be used.

Wilkie,[26] writing in the Edinburgh Medical Journal, advises that a preliminary X-ray examination of the Gall-bladder area should be made in every case,

because well marked shadows are produced if the Gall-bladder be filled with Calcium rich biliary sand.

Stewart Cross[27] reports a case in which the Gall-bladder was distinctly outlined previous to the administration of the dye. It was found to be filled with greenish mud, consisting of Cholesteral Calcium Carbonate and phosphate.

The writer maintains that such a Gall-bladder would be outlined in the 3rd X-ray photograph, (i.e. 40 hrs. after the dye is given) but delayed emptying and sudden common bile duct obstruction after absorption of the dye would have to be excluded.

A possible fault in this technique, which unfortunately under the circumstances could not be avoided, must be pointed out at this stage. The first X-ray negative should be developed and examined for a Gall-bladder shadow before the fatty meal is given. If no shadow is observed a second X-ray photograph should be taken 2 - 3 hours after. This would take into account delayed filling.

X-ray technique:- The Potter Bucky diaphragm is always used except in cases where the patient is unable to co-operate in holding his breath, when films are made without it. A metalix B. type of tube is centred over the Gall-bladder region, at a distance of 30", with the patient lying face down on the diaphragm, and a small compressor used.
Exposure - For normal patients a spark gap of 4½", 30 m. a. and 3 seconds exposure, with the grid set at 5 seconds. For patients weighing 150 lbs, a 5" spark gap, 30 m.a. and 4½ seconds exposure. The spark gap, m.a. and exposure are increased according to the thickness of the patient.

Without the Potter Bucky diaphragm, the film is placed under the patient, and the tube centred over the Gall-bladder region, at a distance of about 18", Spark gap 4½", 40 m.a. and ½ second exposure.

In all cases a Paterson's Special intensifying screen in aluminium set cassettes is used.
Ilford type of film used.

The clothes of the patient must be removed, for splashes of food, and various solutions have been found to cast shadows on the film.

The interpretation of the shadows:- Chalecystography has taught us that the position of the Gall-bladder is variable. It is situated high in the sthenic, and low in the asthenic individual. Davies,(28) investigated by the oral method 100 London medical students, and came to the conclusion that the Gall-bladder shadow varies in different individuals, alike in size, shape, position and density. The density of the shadow is as a rule most marked in the fundus, due to the action of gravity.

Some authors assert that irregularity of the Gall-bladder outline signifies adhesions in every case. This is not quite correct, for gas in the hepatic flexure, or ascending colon, tumours of the hepatic flexure and tumours of the liver, may all produce irregularity of the shadow, due to pressure.

Gall stones may be shown as "negative shadows" in a Gall-bladder which functions normally. They

show up as clear areas in the midst of the opaque dye. The interpretation of these shadows demands some caution. As stated by Carman,[29] gas in an overlying segment of the colon and papillomas, may produce shadows which simulate those of gall stones. Held[20] maintains that the visualisation of stones in the Gall-bladder by means of Cholecystography is not as frequent as one would expect. Stones containing an excess of calcium are easily detected, provided that the density of the dye does not equal that of the stones. In such cases, the stones are best visualised when the density of the Cholecystographic shadow dimishes, 20-24 hrs. after the administration of the dye. In most cases of biliary Calculus, however, as is well demonstrated in the writer's series of cases, the Gall-bladder does not function and therefore is not outlined.

The persistent failure of the Gall-bladder to fill and to cast a shadow is of the greatest diagnostic importance.

Constant faintness of the shadow is less reliable, and delay in filling will have a significance which will increase with experience.

For the production of a good Gall-bladder shadow the following are essential requisites:

A. The capsules must be dissolved and the dye must be absorbed.

B. The liver must excrete the dye into the bile.

C. The bile ducts and the Gall-bladder must be free of obstruction.

D. The Gall-bladder must concentrate the bile.

E. The administrative technique must be perfect.

Certain observers record cases in which, for some unknown reason, the Gall-bladder fails to show after the oral administration of Sod. Tetraiodophenolphthalein, but on repetition of the test a few days later, a normal Cholecystogram is obtained.

It is difficult to explain the failure to cast a shadow in these cases. The writer has recently observed two such cases, which are not included in this thesis.

Persistent failure to produce a shadow therefore means gross disease of the Gall-bladder. McLean,[30] Moore,[31] and Zinck,[32] working with the oral method, explain the causation of negative Cholecystograms.

In this thesis, the writer considers a Cholecystogram normal, when, 15 hours after the oral administration of the dye, a clear, regular shadow of the Gall-bladder is seen, containing no negative shadows, and when after a meal rich in fats, the shadow becomes smaller and more dense. In 40 hours the shadow should have completely disappeared.

Wilkie[26] states that early cases of Cholecystitis give normal shadows, and we must not therefore think that, because of a normal Cholecystogram, we are dealing with a healthy Gall-bladder.

Faintness of the shadow means that the Gall-bladder is not acting as a concentrating organ and has thickened walls.

Cholecystography is a great aid in the differential diagnosis of tumours in the upper right abdomen. It also enables us to determine with certainty, whether shadows seen in the Gall-bladder region belong to the Gall-bladder.

Hardman[33] maintains that the oral method is reliable and is capable of giving correct indications as to whether the Gall-bladder is normal, or pathological, in 93% of cases. In the writer's experience this high percentage of correct diagnosis has not been observed.

Toxic Effects:- The writer has seldom observed toxic symptoms following the oral administration of Sodium Tetraiodophenolphthalein. Of the 50 cases operated upon, and recorded in this Thesis, only two showed symptoms. In both cases the dye was administered twice, first in plain capsules, and secondly it was given as a solution in Salutaris water. No symptoms were noted after the administration in capsule form, but nausea, vomiting, and headache, were complained of about 1 hr. after the solution was drunk. These symptoms, however, soon passed off and were very mild. The absence of toxic effects was probably due to the fact that the

capsules were given at intervals during a fairly large meal. Amongst the 20 cases which were examined, and which were not operated upon, one had nausea 1 hour after, and another had nausea and vomiting ½ hour after the capsules were administered.

Levyn and Aaron[25] administered the dye along with grape-juice. Their method is based on the theory that the free acid of Tetraiodophenolphthalein in a finely divided state, is transformed by the duodenal contents into a soluble salt; which is absorbed. Adding the grape-juice to the dye precipitates the free acid, and renders it available for absorption.

In 100 oral administrations, (Whitaker[23]) 68 had no reaction, 8 had nausea, 12 had nausea and vomiting, and 12 had diarrhoea. All were mild. Camp, Reeves and Field[14] state that the reaction is not due to the irritation by the dye in the stomach, but to some action after absorption. Of their 334 cases examined, 69 had nausea up to 1 hour after the dye was given in plain capsules. Held[20] reports that unpleasant effects were not marked in 100 cases. At most there was nausea, rarely vomiting. Neurotic people mostly exhibited these symptoms. Knapp[34] has observed no real reaction following the administration of the dye, while Oakman[35] reports vomiting in many cases.

The studies of Dick and Wallace[36] show that the use of Sod. Tetraiodophenolphthalein, in diagnostic doses, is not free from risk in certain circumstances. They have shown experimentally, that, bile containing dye introduced into the pancreatic duct may produce Acute Pancreatitis. This complication may arise when the common bile duct becomes obstructed by a stone at the ampulla of Vater. They have also shown that in common bile duct obstruction the dye is almost entirely eliminated by the kidneys. The rate of elimination is slow, and the dye can be detected in the urine 18 days after intravenous injection.

Whitaker and Maddock[37] also working on the effects of Sodium Tetraiodophenolphthalein in common bile duct obstruction, maintain that the damage produced to the liver cells is capable of extensive repair, even without relief of the obstruction, and that we need have no fear of a fatal ending from the use of Sodium Tetraiodophenolphthalein in complete biliary obstruction.

Dyas, Sheldon and Dykes[38] report a case of death coincident with the oral administration of Sodium Tetraiodophenolphthalein. The patient suddenly collapsed, became pale, and died the morning after administration. At post mortem the liver was found to be large and pale, with a tear in the right lobe 1" long, from which haemorrhage had taken place. They conclude that

death was due to Acute degeneration of the liver cells, followed by rupture of the sinuses and capsule.

Contraindications:- Most workers hold that the following conditions contraindicate the use of Sodium Tetraiodophenolphthalein:-

A. Advanced liver disease.

B. Advanced cardiac disease with liver congestion.

C. Arteriosclerosis.

D. Pyloric obstruction.

E. Complete biliary obstruction.

Wilkie[26] maintains that the dye should not be administered in:-

A. Jaundiced patients.

B. Patients recovering from Acute Cholecystitis.

C. Old cardiac cases.

D. Patients with renal impairment.

The writer agrees with Milliken and Whitaker,[39] that Sod. Tetraiodophenolphthalein is quite safe in common bile duct obstruction. He has noted no toxic manifestations in this condition, and in cases recovering from Acute Cholecystitis.

McEvedy[40] states that he has found Cholecystography to be of value in cases with jaundice.

4. Cases Investigated.

At the commencement of these investigations, the technique of administration and the reliability of the drug used were tested. Ten patients who were in fairly good health and in whom gall-bladder disease was not suspected, were given the dye orally. In every case the gall-bladder cast a well-defined shadow and emptied normally.

In a further ten cases, showing typical symptoms of gall-bladder disease, no shadow was observed on X-ray examination. All refused operations.

The following is a record of 50 cases operated upon, after investigation by the oral method - thus making a total of 70 cases examined.

Mrs. W.J. - Aet. 55.

Admitted - 21.9.27.

Complaint - Indigestion, constipation and jaundice.

Duration - 4 months.

History -

About four months ago patient commenced to have symptoms of indigestion - feeling of fulness after meals, flatulence, water-brash and constipation. After a time symptoms disappeared, but soon recurred. Two months previous to admission first became jaundiced and vomited after food. Stools clay coloured. Appetite bad. Losing weight.

On Examination:-

Marked jaundice of skin and conjunctivae. Obese. Tongue furred. Teeth healthy. Normal Temp. and pulse. Abdomen - Mass palpated under right costal margin in Gall-bladder region. No tenderness or rigidity. Stomach dilated. Caecum dilated. Liver not enlarged. Heart - slow and enlarged. Other systems normal.

X-ray of Gall-bladder after oral S.T.I.P.

No Gall-bladder shadow seen. Capsules dissolved and very little dye seen in intestines.

Blood Wr. - Negative.

Barium Series - Showed some obstruction around duodenum.

Stool - Showed excess of split fats.

Operation Findings:-

Gall-bladder very distended, so also were the bile ducts. Normal colour and walls not thickened. No stone. Hard carcinomatous growth at head of pancreas. The fundus of Gall-bladder was anastomosed with the pyloric end of stomach after it was drained of 1 pint of dark green bile.

R e m a r k s.

According to some workers the administration of S.T.I.P. is contraindicated in obstructive jaundice, but this patient exhibited no toxic symptoms. As there was stagnation of bile in the Gall-bladder it failed to fill with the dye, and therefore no shadow was produced on X-ray.

Mrs. Lilian M. - Aet. 27.

Admitted - 18.12.27.

Complaint - Epigastric pain radiating to right.

Duration - 1 year, intermittently.

History:-

Two days before admission patient had sudden attack of pain in mid-epigastrium, radiating to right and round to back between shoulder blades. Pain severe and lasted about 10 minutes. On admission, pain spasmodic, and frequent. Vomited during attacks. Flatulence troublesome. Constipated. Jaundiced. For last year has had similar attacks periodically. Jaundiced slightly one year ago.

On Examination:-

Patient slightly jaundiced. Tongue furred. Teeth healthy. Not obese. Temp. and pulse normal. Abdomen - no rigidity. Slight tenderness in epigastrium. No Gall-bladder tenderness. Colon loaded with faeces. Caecum dilated. Diminished liver dulness.

Other systems - Nothing to note.

Blood Wr. - Negative.

X-ray of Gall-bladder after oral S.T.I.P.

No Gall-bladder shadow seen. Capsules dissolved and dye absorbed.

Operation findings:-

Gall-bladder found to be small, fibrotic and filled with stones. Common duct very distended (1" in diameter). Stone in ampulla of Vater. Appendix and other organs normal. Gall-bladder and stone removed.

R e m a r k s.

This case showed no toxic symptoms after administration of the dye. Before operation a diagnosis of Cholecystitis with stone was made.

John P. - Aet. 64. Railway porter.

Admitted - 27.12. 27.

Complaint - Pain in stomach after food, constipation and loss of weight.

Duration - 2 months.

History: -

Patient well until two months ago, when he commenced to have pain in stomach, which became very severe immediately after taking food. Flatulence very troublesome. Feeling of fulness after meals. No heartburn. Appetite poor. Losing weight rapidly. Bowels very constipated. No vomiting. No jaundice.

On Examination:-

Patient very emaciated and of a dusty colour. No jaundice. Tongue furred. Teeth bad.

Abdomen - Tender in epigastrum. Hard nodules palpated under skin of abdominal wall. Free fluid present in abdominal cavity.

Other systems: - Nothing to note.

Barium Series - Irregular stomach and duodenal cap.

Stool - Negative for blood.

X-ray of Gall-bladder after S.T.I.P. (oral)

Faint gall-bladder shadow seen. It empties slowly.

(Previous to operation patient developed jaundice)

Operation findings: -

Extensive carcinomatous growth of stomach found, with

General carcinomatosis of peritoneum. Free fluid in abdominal cavity. Gall-bladder did not empty easily and its wall was slightly thickened.

Nothing was done at operation.

R e m a r k s .

In this case the Gall-bladder filled with the dye, but did not concentrate the bile, therefore only a faint shadow was seen on X-ray.

Mrs. Sarah S. - Aet. 56.

Admitted - 18.1.28.

Complaint - Abdominal pain.

Duration - 14 days.

History:-

For last 14 days patient has had pain in upper abdomen, not radiating and having no relation to the taking of food. Flatulence present. No vomiting. Slightly jaundiced at times. Diarrhoea few days before admission.

On Examination:-

Patient looks healthy. Not obese. No jaundice. Tongue slightly furred. Pulse 100. Temp. normal. Abdomen - Slight tenderness over Gall-bladder area and in right iliac fossa. Nothing else to note. Other systems - Nothing to note.

X-ray of Gall-bladder after oral S.T.I.P.

No shadow of Gall-bladder seen. Dye absorbed.

Operation findings:-

No evidence of disease in stomach, duodenum, appendix or caecum. Gall-bladder appeared to be thicker than normal, but not markedly diseased. It was removed in view of X-ray findings.

Pathological report:- Bile sterile. Section showed a definite inflammatory reaction in submucous coat. A streptococcus was isolated and grew on culture from submucous coat.

R e m a r k s .

This is a case in which the gall-bladder at operation appeared fairly healthy, but proved to be diseased by pathological report and X-ray findings.

Albert R.- Aet. 62.

Admitted - 10.1.28.

Complaint - Pain in upper abdomen.

Duration - 4 days.

History:-

About 4 days ago patient was suddenly seized by pain in epigastrium and right hypochondrium, which radiated to right shoulder. Rigors with perspiration. No vomiting. Flatulence and headache complained of. Constipated. No jaundice.

On Examination:-

Patient obese. Tongue dry and furred. Teeth decayed and gums unhealthy. Temp. 102°. Pulse 120.

Abdomen. Abdominal wall very fat.

Large tender mass can be palpated on right side. Extending one hand's breadth below right costal margin.

Chest - Rhonci all over both lungs.

Other systems - Nothing to note.

Patient's temp. and pulse soon settled to normal.

X-ray of Gall-bladder after oral S.T.I.P.

No shadow seen.

Operating findings:-

Gall-bladder could not be felt after opening abdomen,

as it was bound down by dense adhesions. These were freed with difficulty and abdominal cavity packed off. Gall-bladder ruptured and foul smelling pus was discharged. It was finally removed and found to be large and markedly diseased.

R e m a r k s.

In this case the mass palpated could not definitely be proved to be an enlarged Gall-bladder. As no shadow was seen on X-ray exmination, Gall-bladder disease was diagnosed. This was proved at operation.

George G. - Aet. 54.

Admitted - 6.1.28.

Complaint - Pain in stomach, vomiting, weakness and loss of weight.

Duration - 16 years.

History:-

In 1912 patient had haematemesis with pain in stomach shortly after food. Four years later, operated on for perforated gastric ulcer (ulcer sutured only). Felt well for 4 years after operation, then had recurrence of symptoms. Now complains of pain in stomach immediately after food, relieved by lying down on left side. Waterbrash and heartburn troublesome. Vomited few times before admission. Constipated. Appetite good. Losing weight. Never jaundiced.

On Examination:-

Tongue furred. Teeth and gums unhealthy.

Abdomen - Epigastric and suprapubic scars. Tender in epigastrium. Nothing palpated abnormal. No tenderness in Gall-bladder region.

Other systems - Nothing to note.

Barium Series - Delay in emptying of stomach. Duodenal cap deformed.

X-ray of Gall-bladder after oral S.T.I.P. - Negative.

Operation findings:-

Stomach bound down in a mass of adhesions. Healed ulcer at pyloric end of stomach. Pylorus obstructed. Gall-bladder was buried in adhesions; walls were not thickened and it emptied after adhesions were freed.

Posterior gastro-enterestory only, performed.

R e m a r k s.

It is difficult to explain why no Gall-bladder shadow was seen on X-ray. The adhesions probably prevented the normal emptying and filling of the Gall-bladder.

Laura B. - Aet. 44.

Admitted - 21.1.28.

Complaint - Pain under right costal margin with vomiting. Constipation.

Duration - Years.

History:-

For years patient has had periodic attacks of pain in right hypochondrium, shooting to right shoulder and accompanied by vomiting. Flatulence troublesome. Constipated. This patient had been admitted to hospital a few months previously giving a history of pain in stomach and vomoting shortly after food. Pain was sharp and radiated to right shoulder. Vomiting eased pain. During the attacks she had rigors and perspired. Appetite good. No jaundice. No urinary trouble. The Gall-bladder was X-rayed after oral S.T.I.P. and no shadow was seen. A diagnosis of Chronic Cholecystitis with stone was made, but she refused operation.

Readmitted 21.1.28 with similar symptoms.

On Examination:-

Obese. Tongue furred. Teeth healthy. Temp. and pulse normal. Abdomen - very atonic. Tender

under right costal margin. No rigidity and nothing abnormal palpated.

X-ray of Gall-bladder after oral S.T.I.P. (2nd X-ray)

No shadow of Gall-bladder seen.

Operation findings:-

Stomach and duodenum normal. Gall-bladder very thick walled and of red-yellow colour. No stones palpated. Appendix long oedematous and inflamed. The Gall-bladder and appendix were removed.

Pathological report:-

Appendix showed sub acute and chronic inflammation. Gall-bladder showed chronic inflammation of mucous and submucous layers.

R e m a r k s.

In this case a diagnosis could be made from the history alone, but the negative X-ray findings helped to confirm it.

Mrs. Helen S. - Aet. 56.

Admitted - 2.2.28.

Complaint - Cough, difficulty of breathing and vomiting.

Duration - Years.

History:-

For years patient has been troubled with asthmatical attacks - difficulty of breathing, shortness of breath and cough. For last week she has had attacks of vomiting, having no relation to the taking of food. No jaundice previously. Bowels regular. Appetite good. No urinary trouble. No abdominal pain. Flatulence not troublesome.

On Examination:-

Patient obese. Slight jaundice of selerotics. Tongue furred. Teeth healthy.

Abdomen - very tense. Tender in upper right Quadrant.

Heart - enlarged with aortic systolic murmur.

Chest - harsh vesicular breath sounds all over both lungs with prolongation of expiratory sound. Rhonic over both lungs.

Other systems - Nothing to note.

X-ray of Gall-bladder after oral S.T.I.P.

No shadow of Gall-bladder seen.

Operation findings:-

Stomach and duodenum normal. Kidneys normal. Gall-bladder small with very swollen and inflamed wall, One stone palpated. Gall-bladder removed.

R e m a r k s.

This was a case of symptomatic Asthma for which a cause had to be found. It was only after X-ray examination that the Gall-bladder was suspected. Cholecystography was therefore a great help in this case. Patient reccvered from her asthma after the operation.

Mrs. Edith W. - Aet. 61.

Admitted - 16.2.28.

Complaint - Pain in epigastrium and in back, with nausea and vomiting.

Duration - 1 day.

History:-

On day of admission patient was suddenly seized by pain in interscapular region, shotting round to right epigastrium. The pain was of a severe colicky nature and was accompanied by nausea and vomiting. Flatulence very troublesome. No jaundice. Had similar attack 6 months ago. About 17 years ago had operation at the London Hospital when the Gall-bladder was drained. Jaundiced then, but not since the operation. Bowels regular, but motions rather paler than normal.

On Examination:-

Old Kocker angulated scar on abdominal wall.

Very obese. Extremely tender over Gall-bladder region. Nothing else to note.

Other systems - Nothing to note.

X-ray of Gall-bladder after oral S.T.I.P.

No shadow seen.

Operation findings:-

Owing to adhesions abdominal cavity was opened with difficulty. Gall-bladder very fibrosed and contained one large stone. Gall-bladder and stone removed.

R e m a r k s.

The history was fairly definite in this case, but X-ray examination helped to confirm diagnosis.

Mrs. Katherine F. - Aet. 62.

Admitted - 21.2.28.

Complaint - Pain in epigastrium after food, ~~a~~ and cough.

Duration - 2 years.

History: -

For last two years, at intervals, patient has had attacks of epigastric pain after food. During last few months attacks have been more frequent. Severe attack four days before admission. No vomiting or nausea. Flatulence not very troublesome. Appetite good. No jaundice.

On Examination: -

Patient not obese. Indefinite mass palpated in right hypochondrium, which is tender. Slight tenderness over rest of abdomen.

Chest - Rhonic heard over both lungs.

Other systems - Nothing to note.

X-ray of gall-bladder after oral S.T.I.P.

No shadow of gall-bladder seen.

Operation findings:

With difficulty entrance was gained to the peritoneal cavity owing to dense adhesions. Gall-bladder was buried in a mass of adhesions, and its wall was found to be very thick and red in colour. No stone. Appendix not diseased.

The gall-bladder and appendix were removed.

Remarks :-

With this indefinite history a diagnosis was only made after receiving the X-ray report on the gall-bladder.

Balfour B. - Aet. 45.

Admitted - 16.3.24

Complaint - Pain in stomach after food, vomiting of blood, and weakness.

Duration - 1 week.

History: -

For last 6 years patient had been troubled "on and off" with indigestion - pain in stomach one hour after food, relieved by taking more food. Flatulence. No heart-burn or waterbrash. Appetite good. Bowels regular. One week before admission he vomited a large quantity of dark blood. Operation 8 years ago when appendix was removed.

On Examination. Patient in a very anaemic and weak state on admission. Teeth false. Tongue clean.

Abdomen - No tenderness or rigidity. Stomach dilated.

Other systems - Nothing to note.

X-ray gall-bladder after oral S.T.I.P. (6 weeks after admission) no shadow seen.

Barium Series: - Shows stomach ulcer.

After prolonged medical treatment patient improved and was operated on.

Operation findings: - Ulcer found on anterior wall of stomach 2½" above pylorus; practically healed. It had almost perforated. Well-marked duodenal ulcer also found.

Gall-bladder buried in adhesions, but emptied normally after freeing. The Gall-bladder was left and a gastro-enterostory performed.

Remarks :

This is another case in which the Gall-bladder evidently failed to fill and empty normally owing to adhesions, thus giving a negative X-ray picture.

Daisy M. - Aet. 39.

Admitted: - 31.3.28.

Complaint - Pain in lower abdomen with vomiting.

Duration - 2 days.

History:-

Two days ago patient was suddenly seized by severe pain around the umbilicus, followed by vomiting. Vomiting has now ceased. Pain on and frequency of micturition also complained of. Bowels always very constipated. Flatulence very troublesome. No previous attacks. No jaundice.

On Examination:

Patient not obese. Tongue furred. Teeth false. Temp. 100. Pulse 110. Abdomen tender in right iliac fossa. No rigidity.

Other systems - nothing to note except inflamed bladder on Cystoscopic Examination.

A diagnosis of Acute Appendicitis was made; patient was left and condition settled down.

Barium Series:-

Normal. Faint shadows in Gall-bladder region suggestive of calculi.

X-ray of Gall-bladder after oral S.T.I.P.

No Gall-bladder shadow, but some faint shadows seen as on the barium series plate.

Operation findings:- 24.4.28.

Gall-bladder markedly fibrosed and filled with small stones. Stomach and duodenum normal. A red and inflamed appendix removed along with Gall-bladder.

Remarks:-

This is a case in which indefinite shadows were seen in the Gall-bladder area. As the Gall-bladder cast no X-ray shadow after the oral administration of S.T.I.P., it seemed reasonable to suppose that these shadows were gall stones in a diseased Gall-bladder.

Thomas J. - Aet. 50. Plumber.

Admitted - 7.4.28.

Complaint - Pain in stomach after food, headache and constipation.

Duration - 7 years.

History:-

For last 7 years "on and off" patient has complained of pain in stomach shortly after meals. Flatulence troublesome. Vomited a few times two months ago, but vomited material contained no blood. Had severe haematemesis 7 years ago. Appetite good. Not losing weight. No heartburn. No jaundice.

On Examination:-

Patient pale and not well nourished. Tongue furred. Teeth not healthy.

Abdomen - Tender in epigastrium. Nothing else to note.

Other systems - Nothing to note.

Barium Series - Hypotonic stomach with constriction about its middle.

X-ray of Gall-bladder after oral S.T.I.P.

No shadow seen.

Operation findings:-

Gall-bladder large but otherwise appears healthy. Chronically inflamed and adherent appendix removed. The stomach showed a tight stricture across it 2" above pylorus due to old ulcer.

A gastro-plasty was performed.

Remarks:

In this case we have a Gall-bladder, which at operation was enlarged slightly, but otherwise appeared healthy, giving no shadow on X-ray. I suggest that the diseased appendix reflexly caused a spastic condition of the Sphincter of Oddi, thus preventing the Gall-bladder from emptying properly. As insufficient dye could enter the Gall-bladder, no shadow was observed on X-ray examination.

Mrs. Lily P. - Aet. 57.

Admitted - 15.5.28.

Complaint - Pain in right hypochondrium. Diarrhoea and vomiting.

Duration - 4 years "on and off".

History:-

For last four years patient has had attacks of pain in right hypochondrium, radiating to back and right shoulder, followed by vomiting and diarrhoea. Flatulence very troublesome. Waterbrash. No jaundice.

On Examination:-

Patient very obese. Not jaundiced. Abdomen - Tenderness under right costal margin in Gall-bladder area. Nothing further to note.

Other systems - Nothing to note.

Barium Series:-

Suggestions of Cholecystitis.

X-ray of Gall-bladder after oral S.T.I.P.

No shadows seen.

Operation findings:-

Gall-bladder fibrosed and adherent to duodenum. No stone present. Appendix long but not diseased. The Gall-bladder and appendix were removed.

Remarks.

This is a straightforward case of Chronic Cholecystitis giving a negative Cholecystogram.

Elsie S. - Aet. 27.

Admitted - 25.6.28.

Complaint - Epigastric pain with vomiting. Jaundice.

Duration - 1 year.

History:-

About 3 days before admission patient suddenly developed severe epigastric pain, followed by vomiting and later jaundice. The pain commenced over Gall-bladder region and radiated downwards and towards the back. Pain exaggerated on deep inspiration.

She has had 3 similar attacks in the last 12 months.

Flatulence troublesome. Bowels constipated.

On Examination:-

Slight jaundice of skin and sclerotics. Obese.

Tongue furred and breath offensive.

Temp. 101°, Pulse 104 on admission, but soon settled to normal.

Abdomen - Fat. Tenderness over Gall-bladder region.

Other systems - Nothing to note.

X-ray of Gall-bladder after oral S.T.I.P.

No Gall-bladder shadow.

Operation findings:-

Gall-bladder enlarged with thick red walls, containing one large and several small stones. Appendix bound down by adhesion. Appendix and Gall-bladder removed.

Mrs. Sarah F. - Aet. 61.

Admitted - 9.6.28.

Complaint - Pain in right iliac region with vomiting. Flatulence.

Duration - 24 hrs.

History:-

Suddenly seized by pain in right iliac region 24 hrs. before admission, preceded by vomiting. Flatulence always troublesome. Bowels always constipated. Appetite bad. No urinary trouble. Cough complained of with pain in right side of chest on coughing. No previous attacks of pain.

On Examination:-

Patient very obese. Temp. 100·4. Pulse 100. Abdomen - Tender mass palpated about 4" below right costal margin which was at the time supposed to be Gall-bladder.

Chest - Rhonci all over both lungs.

Other systems - Nothing to note.

X-ray of Gall-bladder after S.T.I.P.

No shadow seen.

Operation findings:-

Gall-bladder found to have few omental adhesions but otherwise healthy and emptied with ease. High retrocaecal appendix subacutely inflamed and bound down by adhesions. Left-sided ovarian cyst and appendix removed.

R e m a r k s:

It is difficult to explain the negative X-ray findings, but like a few similar cases in this series Gall-bladder adhesions were found.

Charles G. - Aet. 73.

Admitted - 29.7.28.

Complaint - Pain in upper abdomen with nausea.

Duration - 3 days.

History:-

For last three days patient has had attacks of severe pain in upper abdomen, accompanied by nausea. Pain did not radiate in any direction. Flatulence complained of. No vomiting. No jaundice. Bowels regular. Stool clay coloured. Previous attack two years ago which lasted three days.

On Examination:-

Tongue furred. Temp. normal. Pulse 64.

Abdomen - flaccid. Marked tenderness and slight rigidity over Gall-bladder region. Slight tenderness in right iliac fossa.

Other systems - Nothing to note.

Symptoms subsided after two weeks.

X-ray of Gall-bladder after oral S.T.1.P.

No Gall-bladder shadow.

Operation findings:-

Gall-bladder found to be chronically inflamed and

fibrosed, containing one stone $\frac{1}{4}$" x $\frac{1}{8}$". Common duct clear. Appendix not diseased. Other organs healthy. Gall-bladder removed.

R e m a r k s.

A diagnosis of Gall-bladder disease was made on the negative X-ray findings alone, which proved to be correct at operation.

Mrs. Rebecca G. - Aet. 61.

Admitted - 20.7.28.

Complaint - Pain in epigastrium, flatulence, and weakness.

Duration - 4 months.

History:-

For last 4 months patient has complained of pain in epigastrium shortly after meals, radiating to back between shoulder blades. She vomited a few times which relieved the pain. Flatulence extremely troublesome. Losing weight. Constipation marked. No jaundice.

On Examination:-

Patient very obese. Tongue furred. Teeth unhealthy. Temp. and pulse normal. Not jaundiced.

Abdomen - No abdominal tenderness or rigidity. Nothing abnormal palpated.

Other systems - Nothing to note.

Barium Series:- Stomach very dilated, otherwise nothing abnormal to note.

X-ray of Gall-bladder after oral S.T.I.P.

No Gall-bladder shadow.

Operation findings:-

A red, thick walled Gall-bladder was found,

containing no calculi. Appendix chronically inflamed. Other organs healthy with exception of stomach which was large.

Gall-bladder and appendix removed.

Path. Report:-

Gall-bladder - Excessive fibrosis of submucous muscular and Peritoneal coats with scattered foci of small round cells, polymorphis and eosinophils. Saprophytic organisms seen in direct film and grew on culture.

Appendix - chronically inflamed with eosinophils in submucous coat. Streptococci and B. Cali grew on culture.

Mrs. Margaret G. - Aet. 32.

Admitted - 16.7.28.

Complaint - Pain in upper abdomen and jaundice.

Duration - 5 weeks.

History:-

About five weeks ago patient commenced to have pain in upper abdomen, coming on at irregular intervals and followed by jaundice. During last few days pain has become more severe and radiated round to back. No nausea or vomiting. Flatulence troublesome. Bowels regular. Stool pale.

On Examination:-

Jaundice fairly well marked all over body. Tongue furred and breath foul smelling. Teeth healthy. Temp. and pulse normal.

Abdomen - Rigidity and tenderness over upper right rectus. Nothing palpable abnormal. No free fluid.

Other systems - nothing to note.

X-ray of Gall-bladder after oral S.T.I.P.

No shadow seen.

Operation findings:-

Gall-bladder found to be large with thick walls and containing numerous small mulberry stones. It was

adherent to omentum and showed signs of recent inflammation. Appendix which did not show disease was removed along with Gall-bladder.

Remarks:-

In this case of obstructive jaundice the patient showed no toxic symptoms after the oral administration of S.T I.P.

Charles C. - Aet. 54. Labourer.

Admitted - 27.7.28.

Complaint - Pain in epigastrium and between shoulder blades. Flatulence and vomiting.

Duration - 9 months.

History:-

Patient in good health until 9 months ago when he commenced to have epigastric pain shortly after food. Flatulence and constipation troublesome. Appetite bad. Losing weight. Despite treatment, symptoms increased in severity and shortly before admission he vomited a few times. The pain varied in relation to food - sometimes five hours after and passed to back between shoulder blades. Vomited Coffee-ground vomit before admission.

On Examination:-

Well nourished. No jaundice. Tongue clean. Teeth and gums unhealthy. Temp. and pulse normal.

Abdomen - Tender in epigastrium and in Gall-bladder region. Nothing further to note.

Other systems - Nothing to note.

Barium Series:- Report suggests Cholecystitis.

X-ray Gall-bladder after oral S.T.I.P.

No shadow seen.

Operation findings:-

Stomach, duodenum and appendix healthy. Gall-bladder

small, fibrosed and filled with stones and sand. Cholecystectomy performed.

R e m a r k s.

Operation in this case was advised on account of the negative X-ray finding after oral S.T.I.P. The surgeon who saw the case was more in favour of a diagnosis of pyloric ulcer, but was eventually persuaded to operate.

Mrs. Kate H. - Aet. 44.

Admitted - 6.8.28.

Complaint - Abdominal pain with nausea and flatulence.

Duration - 1 week.

History:-

About 1 week before admission patient was suddenly seized by severe epigastric pain, 1 hour after food, which radiated round to back. This subsided and was followed by three similar attacks. Nausea, but no vomiting. Flatulence troublesome. No heartburn.

Previous illness:-

1. Gastric Ulcer with Haematemisis 14 years ago.

2. Appendix removed 2 years ago.

On Examination:-

Patient very obese. No jaundice.

Temp. and pulse normal.

Abdomen - Tender over Gall-bladder area. No rigidity. Nothing further to note.

Other systems - Nothing to note.

X-ray of Gall-bladder after oral S.T.I.P.

No shadow seen.

This patient refused operation and was discharged. On 26.11.28 she returned with similar symptoms plus vomiting and was operated on.

Operation findings:-

Gall-bladder found with walls markedly thickened

and containing one mulberry stone. Cholecystectomy performed. Other organs were normal.

Mrs. Elizabeth S. - Aet. 54.

Admitted - 14.8.28.

Complaint - Pain in epigastrium and between shoulder blades.

Duration - Years "on and off".

History:-

For years, at irregular periods, patient has been troubled with pain in epigastrium and between shoulder blades, having no relation to the taking of food. Flatulence extremely troublesome. Lately the attacks of pain have been very severe. No vomiting. No flatulence. Bowels regular.

On Examination:-

Patient very obese. No jaundice.

Temp. and pulse normal.

Abdomen - Tender in epigastrium. Nothing further to note.

Other systems - Nothing to note.

X-ray of Gall-bladder after oral S.T.I.P.

Gall-bladder shadows seem rather fainter than normally. Empties well.

Operation findings:-

Gall-bladder and its ducts appeared healthy. Appendix was chronically inflamed and was removed. Other organs normal.

R e m a r k s.

In spite of the X-ray report that the Gall-bladder functioned normally, a diagnosis of Cholecystitis with stone was made and patient operated on. No obvious disease of the Gall-bladder was found at operation.

Mrs. Elizabeth B. - Aet. 43.

Admitted - 23.8.28.

Complaint - Pain in right hypochondrium with vomiting.

Duration - 4 days.

History:-

Sudden onset of severe pain in right hypochondrium with vomiting, four days ago. Pain griping and intermittent, coming on shortly after meals and followed by vomiting. No jaundice. No flatulence. Bowels regular. No previous attacks.

On Examination:-

Tongue dry and furred. No jaundice.

Temp. 102°, pulse 120.

Abdomen - Very protuberant but moves well with respiration.

Rigid and tender all over right side. Nothing else to note.

Other systems - Nothing to note.

This condition settled down after a few days and later patient was X-rayed.

X-ray of Gall-bladder after oral S.T.I.P.

No shadow seen.

Operation findings:-

Gall-bladder found to be very tense, congested and filled with pus and stones. It was removed. Other organs normal.

R e m a r k s.

But for the X-ray report on the Gall-bladder after oral S.T.I.P., this patient would probably not have been advised to have the operation.

Thomas H. - Aet. 40. Carpenter.

Admitted - 17.9.28.

Complaint - Oedema of legs and constipation.

Duration - 1 week.

History: -

About one week ago patient commenced to have Oedema of legs. Markedly constipated. No other symptoms except slight cough. No jaundice.

On Examination: -

Patient looks pale. Teeth and gums unhealthy.

Abdomen - veins along sides of abdomen extremely dilated and tortuous.

Free fluid in abdominal cavity.

Liver enlarged. Spleen not palpable.

Mass palpable three fingers breadth below right costal margin.

Chest: - Harsh vesicular breath sounds all over both lungs.

Dilated veins along side of chest wall.

Heart, etc., - Nothing to note.

Blood Count - R.B.C. 5,000,000

W.B.C. 5,000

Polys.	-	68%
L.Lymps	-	3%
S.Lymps	-	21%
Hyaline	-	4%
Eosinophils		3%
Mast cells		1%

No abnormality of reds.

Urine: Albumin and blood present.

Pyelography: Large renal pelvis on right side.

Blood Wr. Negative.

X-ray Gall-bladder after S.T.I.P.

Normal Gall-bladder shadow.

A diagnosis was made of a right-sided hypernephroma causing obstruction of vena cava and an operation advised.

Operation findings:-

Large mass of glands in right renal region found pressing on vena cava.

Gall-bladder and other organs appeared healthy. The mass could not be removed.

R e m a r k s:

This is a case in which Cholecystography proved a valuable aid to diagnosis. As the Gall-bladder showed normal shadows and functioned well, Cholecystic disease was excluded from a list of probable conditions.

Mrs. Lucy R. - Aet. 46.

Admitted - 4.9.28.

Complaint - Pain in back and right hypochondrium with vomiting.

Duration - 2 years.

History:-

For two years patient has had periodic attacks of vomiting lasting 24 hrs., accompanied by pain in back and right hypochondrium. Frontal and occipital headache also present during attacks. Flatulence always troublesome. Losing weight lately. Appetite not good. Bowels regular. No jaundice.

On Examination:-

Patient not obese and appears healthy.

Pulse and temp. normal.

Abdomen - liver enlarged. Mass palpated in right hypochondrium.

Other systems - nothing to note.

X-ray of Gall-bladder after oral S.T.I.P.

Normal Gall-bladder shadows and normal functioning.

Operation findings:-

Gall-bladder appears healthy and empties easily. Liver low in position with enlargement of right lobe. Other organs appeared healthy. A mass was seen about

the size of a fist lying at the side of the duodenum and adherent to the vena cava. This was removed.

Pathological report:-

Specimen of a granulomatous gland, probably tubercular.

R e m a r k s :

In this case the mass palpated below the right costal margin was thought to be an enlargement of the Gall-bladder. This was excluded when the Cholecystogram showed a normal functioning Gall-bladder.

Mrs. Rose E. - Aet. 61.

Admitted - 2.9.28.

Complaint - Severe abdominal pain with vomiting.

Duration - 1 day.

History:-

Sudden onset of severe abdominal pain accompanied by vomiting the day before admission. The pain was localised to upper right abdomen and radiated downwards. For some time she has been troubled by flatulence and heartburn after meals. Similar attacks of pain 2 years ago. Bowels regular. Appetite good. No urinary symptoms.

On Examination:-

Patient in collapsed condition on admission. Tongue furred. Teeth healthy. Temp. 99·2, pulse 76. No abdominal rigidity or tenderness. Patient's condition soon settled and after a week she had her Gall-bladder X-rayed.

X-ray of Gall-bladder after oral S.T.I.P.

No shadow seen.

Operation findings:-

The Gall-bladder was found to be very red and acutely inflamed. No stones. It was removed along with appendix which was not diseased. All other organs appeared healthy.

R e m a r k s.

Previous to Cholecystography this case was diagnosed as one of probable Renal Calculus. After seeing the

X-ray report a diagnosis of Acute Cholecystitis was made and proved at operation. As the Gall-bladder was acutely inflamed it failed to concentrate the dye laden bile, therefore no shadow was seen on X-ray examination or it failed to fill with bile.

Mrs. Emery R. - Aet. 53.

Admitted - 18.10.28.

Complaint - Attacks of severe abdominal pain.

Duration - 1 week.

History:-

For last week patient has had attacks of pain in upper right abdomen. The pain was intermittent, severe and passed through to back. No vomiting. Flatulence very troublesome. Bowels regular. No previous attack.

On Examination:-

Patient not obese. No jaundice. Tongue furred. Teeth healthy. Temp. 99°, pulse 100.

Abdomen - Tender and rigid over Gall-bladder area. Nothing else to note.

Other systems - Nothing to note.

X-ray Gall-bladder after oral S.T.I.P.

No shadow seen.

Operation findings:-

The Gall-bladder was found buried in a mass of omental adhesions. It was very red, swollen and contained a large number of stones and muco-pus. It was removed. Rest of organs appeared healthy.

Mrs. Annie H. - Aet. 56.

Admitted - 6.10.28.

Complaint - Pain in upper abdomen.

Duration - 2 months.

History:-

For last two months patient has complained of a constant pain in right hypochondrium, which tends to pass down into groin. No radiation to right shoulder. No vomiting. Never jaundiced. Very constipated. Flatulence troublesome. Losing weight. Cough and night sweats at commencement of illness. No urinary trouble.

On Examination:

Patient very obese. Tongue furred. Teeth healthy. Temp. and pulse normal.

Abdomen - Tenderness over right kidney region.
Nothing further to note.

Urine - Nothing pathological to note.

Faeces - Do.

Chest - Emphysematous.
X-ray examination negative.

Heart - Slow and sounds closed.

X-ray of Gall-bladder after oral S.T.I.P.

No shadow seen.

As nothing could be found on examination to

explain her symptoms and as Cholecystography was negative, operation was advised.

Operation findings:

The Gall-bladder which was a little redder than normal, but otherwise did not appear pathological, was found buried in omental adhesions at its lower end. No stones. The appendix which was long but not diseased, was removed along with the Gall-bladder.

Pathological report:

The Gall-bladder shows atrophy of its mucosa with a mild degree of Chronic inflammation.

Remarks :

This is another case in which the Gall-bladder did not appear pathological at operation but was involved in adhesions. This might have prevented the normal emptying and filling, but the pathological report showed that there was atrophy of the mucosa along with a mild degree of Chronic inflammation, thus producing defective concentration of bile - hence the negative X-ray findings. Cholecystography was a great aid to diagnosis in this case.

Winifred R. - Aet. 32.

Admitted - 25.10.28.

Complaint - Abdominal pain with nausea.

Duration - 3 weeks.

History:

For last three weeks patient has had pain in upper right abdomen and right iliac fossa. The pain is constant and is also present low down in back; it does not radiate to right shoulder. Nausea is present after food. Patient is gaining weight rapidly and has loss of energy. Large amount of urine passed per day. She is under treatment for myxoedema.

On Examination:

Very obese and lethargic. Slow in thought and speech. No jaundice.

Temp. and pulse not raised above normal.

Abdomen - tenderness in epigastrium and in right iliac fossa.

X-ray of Gall-bladder after oral S.T.I.P.

Gall-bladder fills and empties normally.

No irregularities of shadow.

Operation findings:

Gall-bladder and its ducts appeared healthy. No calculus present. Appendix found retrocaecal and bound down by adhesions. It was removed. Other organs healthy.

Remarks.

A diagnosis of Cholecystic disease was made in this case. Cholecystography proved correct at operation. This patient had the usual dose of S.T.I.P. (5 g.) although she was very fat and distinct X-ray shadows were produced.

Mrs. Alice B. - Aet. 53.

Admitted - 24.10.28.

Complaint - Upper abdominal pain.

Duration - 2 years.

History:-

About two years ago patient was suddenly seized by severe epigastric pain, having no relation to food and accompanied by vomiting which relieved the pain. Pain radiated to right shoulder. Never jaundiced. She has had a few similar attacks since and had one shortly before admission. Previous to attack she becomes flushed. Bowels regular. No urinary trouble.

On Examination:

Very obese. Tongue furred. Teeth healthy. Temp. and pulse normal.

Abdomen - tender over Gall-bladder area. No rigidity.

Other systems - nothing to note.

X-ray of Gall-bladder after oral S T.I.P.

No shadow seen.

Operation findings:-

Gall-bladder found to be markedly fibrosed and filled with calculi and muco-bile. Left ovarian cyst and Gall-bladder removed. Other organs normal.

James O. - Aet. 42.

Admitted - 11.11.28.

Complaint - Abdominal pain with vomiting.

Duration - 24 hours.

History:-

Patient suddenly seized by severe griping pain in epigastrium, followed by vomiting. The pain passed through to back between shoulder blades. Bowels not regular. No flatulence. No jaundice. Appetite poor. Constipated before admission. Cough present for last week.

On Examination:

Patient very pale. Tongue furred. Teeth decayed and gums unhealthy. Abdomen - Tenderness in gall-bladder area. No rigidity. Nothing else to note except colon loaded with faeces.

Chest - Signs of bronchitis.

Other systems - Nothing to note.

X-ray of Gall-bladder after oral S.T.I.P.

1. With Capsules. - No shadows seen.
2. Patient given the dye without capsules mixed with Salutaris water. - No shadow seen.

Operation findings:

Gall-bladder found to be large and red with adhesions around cystic duct. It was removed. Other organs healthy.

Remarks.

In this case cholecystographic findings proved to be correct at operation. The administration of S.T.I.P. was repeated without the capsules and half an hour after he exhibited nausea and headache which lasted for some time. This is the first case in the series to have toxic symptoms after taking the dye, and it was then only when the capsules were omitted.

Mrs. Juliette H. - Aet. 45.

Admitted - 3.11.28.

Complaint : - Abdominal pain with nausea.

Duration: - 8 days.

History: -

For months patient has been troubled with indigestion - feeling of fullness after meals with flatulence and heartburn. About 8 days ago she was suddenly seized by severe epigastric pain accompanied by nausea. The pain passed through to back. Rigors present. No urinary trouble. No jaundice. Bowels not regular.

On Examination:

Patient not obese. Tongue furred and breath foul-smelling. Teeth and gums in diseased condition. Slight jaundice of sclerotics. Temp. and pulse normal. Abdomen: - Tenderness only in epigastrium on deep pressure. Nothing further to note.

Other systems: - nothing to note.

X-Ray of gall-bladder after oral S.T.D.P.

Distinct shadows seen, lying low and laterally. Gall-bladder empties quickly.

Operation findings: -

Gall-bladder appeared healthy and emptied easily.

Operation findings: (con.)

Appendix found markedly diseased with signs of recent inflammation. It was well bound down and had a little pus around it. Other organs normal. Appendix only removed.

Remarks :

In this case the history was very suggestive of cholecystic disease, but this was ruled out after S.T.I.P. examination and later proved at operation.

William T. - Aet. 52. Army Officer.

Admitted - 18.11.28.

Complaint - Abdominal pain with vomiting of blood.

Duration - 12 hours.

History: -

About 12 hours before admission patient suddenly became faint and vomited a large quantity of bright red blood. He collapsed and became unconscious for a short time. For last two years he had been troubled with indigestion - pain between shoulder blades with feeling of discomfort and flatulence shortly after meals. Bowels constipated. Appetite good. Never jaundiced.

Previous illness - Sprue, Colitis and Malaria.

On Examination: -

Patient very pale with weak and rapid pulse. Very obese. Teeth good. Tongue clean.

Abdomen - Tenderness in epigastrium and right iliac fossa. Nothing further to note.

Heart: - Rapid with weak sounds. Systolic murmur at all areas. Enlarged to left and right.

Other systems - Nothing to note.

Stool - Blood present.

Barium Series: No ulcer cavity seen. Duodenal cap deformed.

X-ray of Gall-bladder after oral S.T.I.P.

No shadow seen. No stones visible.

Operation findings:

Gall-bladder found to be markedly fibrosed and adherent to duodenum. It contained two large mulberry calculi. The appendix was found to be chronically inflamed and bound down by adhesions. The gall-bladder and appendix were removed. All other organs normal. No liver cirrhosis.

Remarks:

This is a very interesting case and proves the value of cholecystography after S.T.I.P. The case was treated for six weeks as one of gastric ulcer. His gall-bladder was then X-rayed and operation advised. It is very difficult to explain the severe haematemesis and it is only suggested that it may have been due to duodenal ulceration at the site where the gall-bladder was adherent to it. There was no evidence of ulceration of the duodenum or stomach and no cirrhosis of the liver found at operation.

The writer has seen another similar case which had a severe haematemesis and was treated for gastric ulcer. At operation the gall-bladder was markedly fibrosed and adhered to the duodenum. No evidence of gastric or duodenal ulceration found.

Joseph S. - Aet. 61.

Admitted - 22.11.28.

Complaint - Pain in epigastrium after food.

Duration - 18 months.

History: -

For the last 18 months, at intervals, patient has complained of pain in epigastrium about two hours after taking food. The taking of more food relieved pain for a little. Nausea sometimes present. Flatulence very troublesome. Appetite fairly good. Losing weight. Had haematemesis 12 years ago. Never jaundiced.

On Examination:

Patient looks fairly well. No jaundice or wasting. Teeth and gums unhealthy. Tongue furred.

Abdomen - Slight tenderness in epigastrium.

Stomach dilated with marked splashing. Nothing further to note.

Other systems - nothing to note.

Stool: - No occult blood present.

Barium Series: - Deformed duodenal cap with slow emptying of stomach.

X-ray of Gall-bladder after oral S.T.I.P.

1. with capsules - Negative
2. without capsules - Negative.

Operation findings:

The gall-bladder was found to be extensively diseased with very thick walls. No calculi were present. The stomach showed a stricture about ¾" above pylorus due to healing of old ulcer. Appendix was chronically inflamed. Appendix and gall-bladder removed and gastro-enterostomy performed.

Remarks:

This case was thought to be one of pyloric ulcer, and it was only after cholecystography that gall-bladder disease was suspected. After the first administration of S.T.I.P. a few of the capsules remained in the stomach undissolved for four days, and it was thought that insufficient dye had reached the liver, so it was administered again about ten days later without the capsules. No toxic symptoms were noted after either administration.

Alice E. - Aet. 54.

Admitted - 3.11.28.

Complaint - Pain in epigastrium and in back after food. Vomiting and flatulence.

Duration - Three months.

History:

For last 3 months patient has had attacks of pain in epigastrium, about half hour after food, passing through to back and across to left side of abdomen. Rigors accompany the pains. Vomiting and flatulence very troublesome. Bowels constipated. Jaundiced six weeks previous to admission.

On Examination: -

Patient very obese. Sclerotics jaundiced. Tongue dry and furred. Breath foul-smelling. Temperature and pulse normal.

Abdomen - Tender in epigastrium above gall-bladder area. Nothing further to note.

Other systems - Nothing to note.

X-Ray gall-bladder after oral S.T.I.P.

Faint shadow of large gall-bladder seen containing 3 stones.

Operation findings:

The gall-bladder was found to be of normal colour and contained 3 stones. It emptied with ease.

Appendix not diseased. Cholecystectomy performed.

R e m a r k s :

An X-ray photograph was taken previous to the administration of S.T.I.P. which showed 3 faint shadows in region of gall-bladder.

Prints of the X-ray photograph are included in this thesis.

Mrs. Helen T. - - Aet. 50.

Admitted - 20.11.28.

Complaint: - Pain under right costal margin with vomiting and flatulence.

Duration: 2 weeks.

History:-

For last two weeks patient has had attacks of spasmodic pain under right costal margin, shooting through to back and followed by vomiting. No regular relation to the taking of food. Flatulence very troublesome. Bowels constipated. Jaundiced slightly after attacks. Two years ago patient had similar attack with jaundice.

On Examination:

Patient obese. Skin and sclerotics slightly jaundiced. Temperature and pulse normal.

Abdomen: - Tenderness with slight rigidity under right costal margin; also slight tenderness in epigastrium.

Other systems - Nothing to note.

X-ray of gall-bladder after oral S.T.I.P.

No shadows of gall-bladder seen.

Operation findings:

Gall-bladder found with marked fibrous thickening of its walls and containing one large stone. Abscess found round its neck. Appendix and other

organs healthy. Cholecystectomy and appendicectomy performed.

Remarks :

Although this patient had a slight degree of obstructive jaundice she showed no reaction after S.T.I.P. was administered.

Ivy S. - Aet. 27.

Admitted - 12.11.28.

Complaint - Epigastric pain with vomiting.

Duration - 6 months.

History: -

For last 6 months patient has been troubled by attacks of epigastric pain, radiating through to back between shoulder blades and attended by vomiting. During the attacks she states she is able to feel a "lump" in the right hypochondrium, which disappears a few days afterwards. No rigors but profuse perspiration during attack. Fatty foods not well tolerated. Flatulence and headache troublesome. Bowels constipated.

On Examination:

Patient not obese. No jaundice.

Tongue clean. Teeth healthy.

Abdomen. Tender in epigastrium with no rigidity. Nothing further to note.

X-ray Gall-bladder after oral S.T.I.P.

Gall-bladder not outlined.

Operation findings:

Gall-bladder found with fibrosed walls and packed with stones. No stone in common duct.

Appendix inflamed. Other organs appeared healthy.

Appendicectomy and cholecystectomy performed.

Joseph G. - Aet. 49.

Admitted - 15.11.28.

Complaint - Pain in epigastrium with vomoting.

Duration - 4 months.

History: -

Patient gradually developed severe pain in the epigastrium, having no definite relation to the taking of food. Heartburn troublesome. Appetite bad. Losing weight. Bowels constipated. Vomits at intervals, which relieves pain. Flatulemce also present.

On Examination:

Tongue clean. Teeth unhealthy.

Abdomen: - No tenderness or rigidity and nothing palpated.abnormal.

Other systems: - Nothing to note.

X-ray of Gall-bladder after oral S.T.I.P.

No gall-bladder shadows seen.

Barium Series: - Deformed duodenal cap.

Pathological condition of appendix.

Operation findings:

Appendix found to be very long and bound down by adhesions. Adhesions around the duodenum involving gall-bladder. The gall-bladder appeared

healthy and emptied with ease. No calculi. Large duodenal ulcer present on post. wall.

Appendicectomy and Gastro-enterostomy performed.

R e m a r k s:

This is another case in which the gall-bladder appeared healthy at operation, but showed no shadow on cholecystography, probably due to adhesions preventing normal functioning.

Thomas S. - Aet. 54. Warehouse porter.

Admitted - 26.12.27.

Complaint: - Pain in epigastrium after meals. Weakness, loss of appetite, loss of weight, flatulence and constipation.

Duration: 2 years.

History:

For last two years "on and off" patient has had indigestion - feeling of fullness after meals with flatulence and constipation. About three months ago he commenced to have pain in epigastrium attended by feeling of fullness, two to three hours after meals. No vomiting, no heartburn. Lack of energy and very nervous. Losing weight. Constipation marked. Appetite defective.

On Examination:

Tongue fairly clean. Teeth and gums unhealthy.

Abdomen - no tenderness. Epigastric pulsation present. Nothing further to note.

Chest: - Harsh vesicular breath sounds all over both lungs with expiratory sound prolonged. No accompaniments.

Nervous system:- All jerks increased.

Barium Series:- Quick emptying of stomach. Duodenal cap deformed.

Test Meal:- Nothing abnormal to note.

Stool - No occult blood present.

X-ray gall-bladder after oral S.T.I.P.

Gall-bladder faintly outlined. No delay in emptying.

Operation findings:

No evidence of disease of stomach, duodenum, or gall-bladder found. Other organs also healthy.

Remarks:

Shortly after operation the patient developed a severe chest condition. Sputum found to contain tubercle bacilli. He died two weeks later, with both lungs extensively involved. A dignosis of duodenal ulcer was originally made, but his symptoms were evidently a manifestation of Tuberculosis, which was not diagnosed until after the operation. The gall-bladder produced a faint shadow on X-ray, probably due to faulty concentration of the bile.

Frank W. - Aet. 51. Railway clerk.

Admitted - 3.12.28.

Complaint: Epigastric pain and jaundice.

Duration: 3 days.

History:-

Three days ago, while in bed, patient was suddenly seized by severe epigastric pain of a griping nature, which was not radiated in any direction. No vomiting. Bowels constipated. Appetite good. No loss of weight. Two days later jaundice developed. For some time past he has had indigestion symptoms - dull pain in epigastrium two to three hours after meals, attended by flatulence. He had previous operation - abdominal.

On Examination:-

Patient jaundiced. Tongue furred and breath foul-smelling. Teeth false.

Temperature and pulse normal.

Abdomen - tenderness in epigastrium and under right costal margin. No rigidity.

Gall-bladder palpable. Liver small.

Stool pale.

Other systems - nothing to note.

Bloor Wr. Negative.

X-ray of Gall-bladder after oral S.T.I.P.

No gall-bladder outlined. No shadows visible.

Operation findings:-

Gall-bladder markedly fibrosed and filled with stones. Stone obstructing common bile duct.

Other organs healthy.

Cholecystectomy performed.

Remarks :

This patient showed no reaction after the administration of S.T.I.P. although he had obstructive jaundice.

Charles N. - Aet. 52.

Admitted - 10.12.28.

Complaint - Abdominal pain and flatulence.

Duration - 4 years.

History: -

For the last four years patient has had attacks of epigastric pain, 1½ - 2 hours aftermeals. Flatulence troublesome. No vomiting. Heartburn was complained of at times.
Appetite good; bowels regular; never jaundiced.
There was no radiation of the pain.

On Examination:

Patient very obese with slightly jaundiced sclerotics. Tongue clean. Teeth unhealthy.
Abdomen - very fat; no tenderness and nothing abnormal to palpate.
Other systems - Nothing to note.

Barium Series: Quick emptying of stomach.
Duodenal cap deformed.

X-ray of gall-bladder after oral S.T.I.P.

1. With capsules - No gall-bladder outlined and dye not well absorbed.
2. Without capsules - No gall-bladder shadow seen.

Operation findings: -

Gall-bladder appeared quite healthy and emptied with ease. Old healed duodenal ulcer. A chronically diseased appendix was removed.

Remarks : -

After the first administration of S.T.I.P. no shadow of the gall-bladder was observed on X-ray examination, and most of the dye was seen in the bowels unabsorbed. A second administration was, therefore, ordered, without the capsules - the dye being mixed in 1 tumblerful of Salutaris water; - but no gall-bladder outline was seen.

This is one of the few cases in which a normal gall-bladder failed to give a shadow. As was previously suggested, the diseased appendix may have prevented the normal filling and emptying.

This patient suffered from nausea and vomited a little after the S.T.I.P. was given without the capsules.

Mrs. Marion C. - Aet. 44.

Admitted - 7,1,29.

Complaint: - Abdominal pain and vomiting.

Duration: - 1 day.

History:-

Sudden onset of epigastric pain on day before admission, followed by vomiting. The pain was sharp and spasmodic, but did not radiate to back. Bowels always constipated. No previous attacks. Never jaundiced.

On Examination:

Patient not obese. Tongue furred and breath foul-smelling. Temp. 101°. Pulse 80.

Abdomen - marked tenderness and rigidity right side of abdomen, more marked under right costal margin. Slight tenderness in right iliac fossa.

This patient was left, as diagnosis was not certain, and her acute symptoms soon settled down. Later she was X-rayed.

X-ray of Gall-bladder after oral S.T.I.P.

No gall-bladder shadow seen.

Operation findings:-

Gall-bladder found markedly fibrosed and diseased. No calculi present. Other organs healthy. Cholecystectomy performed.

Mrs. Mary U. - Aet. 46.

Admitted - 1.1.29.

Complaint - Abdominal pain and vomiting.

Duration - 6 months.

History: -

For last six months patient has had attacks of abdominal pain after meals, commencing in epigastrium and radiating round to back on both sides and into lower abdomen. Vomiting accompanies the attacks. Bowels very constipated. Flatulence troublesome. No urinary trouble.

On Examination: -

Patient very obese and slightly jaundiced. Tongue furred; teeth and gums unhealthy.
Abdomen - held rigid all over, but relaxes when spoken to. Tenderness only in loins.
Nothing further to note.
Other systems: - Nothing to note.

X-ray of gall-bladder after oral S.T.I.P.

No gall-bladder outlined.

Operation findings: -

Stomach and duodenum healthy. Thick-walled gall-bladder found filled with small stones. The appendix, which was not diseased, was removed along with the gall-bladder.

Mrs. Mary S. - Aet. 53.

Admitted - 14.1.29.

Complaint - Abdominal pain and vomiting.

Duration - 12 months.

History:

For last twelve months patient has had attacks of abdominal pain followed by vomiting and attended by shivering. The attacks have become more frequent recently. The pain is severe; commences in epigastrium and radiates to right shoulder. Flatulence and constipation troublesome. Never jaundiced.

On Examination: - Temp. and pulse normal. Patient not very obese. Tongue furred. Teeth healthy.

Abdomen - Tender mass palpated below right costal margin.

Other systems - Nothing to note.

X-ray of gall-bladder after oral S.T.I.P.

No gall-bladder shadow seen.

Operation findings:

A very tense and thick-walled gall-bladder containing one stone, found. Appendix found buried in adhesions. Appendicectomy and cholecystectomy performed.

Mrs. Laura S. - Aet. 76.

Admitted - 17.1.29.

Complaint: Abdominal pain and vomiting.

Duration: Few months.

History:

Patient has had several attacks, during last few months, of epigastric pain, accompanied by vomiting after meals. The pain did not radiate in any direction. Flatulence troublesome. Never jaundiced.

On Examination:

Patient not well nourished.

Pulse and temp. normal.

Abdomen - Tenderness under right costal margin.

Nothing to palpate abnormal.

X-ray of gall-bladder after oral S.T.I.P.

No outline of gall-bladder seen.

Operation findings:

A large tense and thick-walled gall-bladder containing one stone was removed. Appendix and other organs appeared healthy.

R e m a r k s :

In this case Cholecystography proved a great aid to diagnosis, as the history was not typical of Cholecystic disease.

Miss Janette T. - Aet. 51.

Admitted - 12.1.29.

Complaint - Abdominal pain and nausea.

Duration - 5 days.

History: -

About five days before admission patient commenced to have intermittent pain to right of umbilicus, which did not radiate. Nausea was present, but no vomiting. Flatulence and headache troublesome. The bowels were constipated. Never jaundiced. She also complained of frequency ofmmicturition.

On Examination:

Patient very obese. Temp. 98°. Pulse 100.

Abdomen: - Distended with free fluid present in abdominal cavity. Tenderness all over abdomen, but more marked in right iliac fossa.

A diagnosis of ruptured right ovarian cyst was made

X-ray gall-bladder after oral S.T.I.P.

Gall-bladder fills and empties normally.

No irregularity or negative shadows seen.

Operation findings: -

Large amount of fluid found in abdominal cavity due to the rupture of a large multilocular left ovario cyst. Gall-bladder appeared healthy and emptied with ease. Appendix and other organs not diseased.

R e m a r k s :

This is a case which gives a normal gall-bladder shadow on Cholecystography verified at operation.

Mrs. Mabel E. - Aet. 38.

Admitted - 13.1.29.

Complaint - Abdominal pain with vomiting.

Duration - 1 day.

History: -

Sudden onset of severe pain in right hypochondrium on day before admission. The pain did not radiate in any direction. Vomiting and shivering attacks present. No urinary trouble; no flatulence. Bowels constipated. She had no previous attack. Never jaundiced.
On 5.8.27 she had operation for twisted ovario cyst and appendicitis.

On Examination:

Tongue furred. Temp. 98°. Pulse 80.

Abdomen: - Scar in right iliac region. Tenderness and rigidity over right upper rectus. Slight tenderness in right iliac fossa.

X-ray of Gall-bladder after oral S.T.I.P. No gall-bladder shadow or shadow of calculi seen.

Operation findings:

At operation nothing was found to account for patient's symptoms. The gall-bladder was not removed as it appeared healthy and emptied easily.

Remarks:

This is another case where the gall-bladder appeared healthy at operation, but showed no shadow on Cholecystography. Her symptoms may have been due to a stone blocking the cystic duct which had passed previous to operation.

Clara B. - Aet. 48.

Admitted - 21.2.29.

Complaint: Epigastric pain with nausea and flatulence.

Duration - 10 days.

History:

Sudden onset of dyspnoea and nausea ten days ago. Two days later complained of severe pain in epigastrium, which was sharp and spasmodic. It did not radiate. Flatulence and headache troublesome. Bowels regular. No jaundice; no previous attack.

On Examination:

Tongue furred. Teeth and gums healthy.

Temp. 100. Pulse 80.

Tender in right hypochondrium and in right renal region. Nothing further to note.

X-ray of gall-bladder after oral S.T.I.P.

Normal filling and emptying.

Operation findings:

Gall-bladder and ducts normal. Mass felt in left iliac fossa. The caecum and appendix were found in left iliac fossa involved in the inflammatory mass. Appendix, which was markedly diseased, was removed.

Remarks :

A diagnosis of subacute cholecystitis was made, but this was disproved at operation and after X-ray examination.

Emily P. - Aet. 56.

Admitted - 1.3.29.

Complaint - Attacks of pain in right hypochondrium with vomiting.

Duration - 1 month.

History: -

For last month patient has had attacks of severe pain in right hypochondrium, radiating to back and right shoulder. Vomiting during attacks. He had indigestion for some time - pain in epigastrium with flatulence shortly after meals. No jaundice. Bowels constipated.

On Examination:

Patient obese. Tongue furred. Teeth healthy.

Temp. and pulse normal.

Tender in right hypochondrium, with slight rigidity. Nothing further to note.

X-ray of Gall-bladder after oral S.T.I.P.

No shadow observed.

Operation findings:

Gall-bladder found to be filled with stones and having markedly thickened walls. Other organs normal. Cholecystectomy was performed.

Elizabeth C. - Aet. 74.

Admitted - 15.3.29.

Complaint - Abdominal pain, vomiting and flatulence.

Duration - 1 year.

History: -

For the last 12 months patient has had attacks of pain under right costal margin, radiating round to back and to right shoulder, accompanied by vomiting. Flatulence extremely troublesome. Bowels constipated. No jaundice.

On Examination:

Tongue furred. Temp. 101; pulse 90.

Tender under right costal margin.

Nothing abnormal palpated.

X-ray of Gall-bladder after oral S.T.I.P.

No gall-bladder outlined.

Shadows of small stones in gall-bladder area.

Liver outlined.

Operation findings:-

Gall-bladder found to be extremely diseased, small, and filled with stones.

Other organs appeared normal.

Cholecystectomy performed.

5. Summary and Conclusions.

In the writer's experience Cholecystography has been an invaluable aid in the diagnosis of gall-bladder disease, and the oral method has proved very satisfactory when the technique advised earlier in this Thesis has been adhered to.

A great number of patients with Cholecystic disease have typical symptoms and a diagnosis could probably be arrived at without the aid of Cholecystography, but the patient with atypical symptoms is the one who gives rise to most worry and thought, when the question of advising operation arises. It is very comforting, therefore, if one can rely on Cholecystographic findings.

A large amount of work has yet to be done in the perfection of the oral method of administering the dye, and it is only by carefully recording large numbers of cases which have been checked at operation and by pathological examination of the removed gall-bladder, that this can be achieved. One great difficulty arises: How many gall-bladders which appear healthy at operation would be considered diseased by the pathologist? This problem may be solved by future investigations.

In the writer's series of 50 cases operated upon,

only three, showing no shadows on X-ray, appeared to have healthy gall-bladders at operation. Two of ~~th~~ these cases had very diseased appendices, and one showed nothing to account for the negative X-ray finding. In five other cases, also showing no shadow, the gall-bladder appeared healthy at operation, but was involved in adhesions, which no doubt prevented the normal functioning.

Repeated failure of the gall-bladder to fill and to cast a shadow is of the greatest diagnostic value. Of the 50 cases recorded, 31 showing negative Cholecystograms were proved at operation to have grossly diseased gall-bladders.

If the gall-bladder casts a well-defined shadow and empties after a fatty meal, it is functioning normally and removal is not indicated, but as pointed out by some workers, early cases of Cholecystitis may show a normal functioning gall-bladder on X-ray examination. In these cases, if early cholecystitis be suspected, the patient should be advised to have repeated examinations at long periods. In this series, 7 cases showing normal cholecystograms were proved at operation to have healthy gall-bladders.

The interpretation of faint shadows is more difficult, and the writer has not had enough experience of these cases to form any conclusions. Of the three cases showing faint cholecystograms, one had marked disease of the appendix, one had stones in the gall-bladder, and the third showed nothing to account for the faintness of the shadow.

Cholecystography is of great value in the differential diagnosis of tumours in the upper right abdomen and of biliary and renal calculi.

Toxic manifestations have been noted in very few of the writer's cases after the administration of Sodium Tetraiodophenolphthalein, in plain gelatine capsules, and when present they were of a mild nature.

The relationship between disease of the appendix and disease of the gall-bladder has been well demonstrated in the cases operated upon.

In conclusion it may be stated that the oral method of administrating Sodium-Tetraiodophenolphthalein is safe, simple, and fairly reliable.

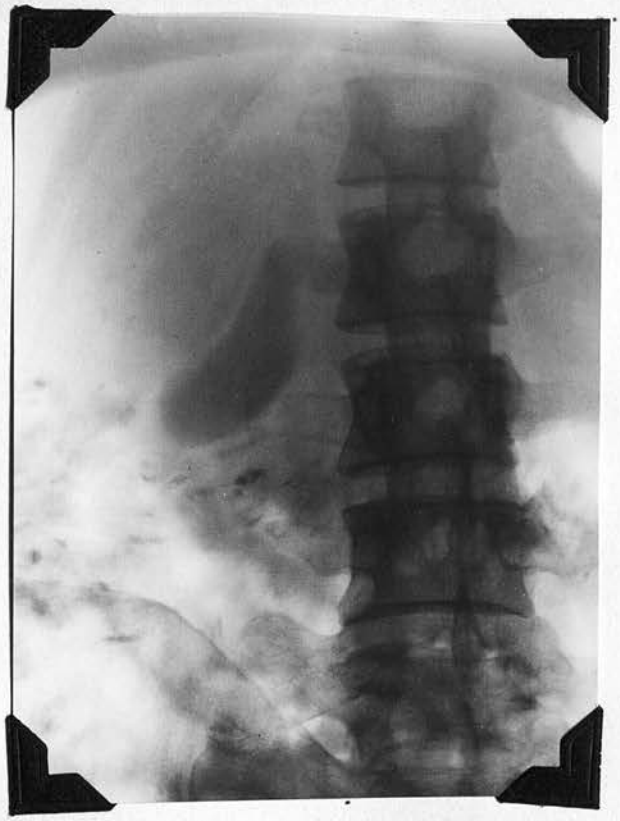
- Finis. -

X-RAY PHOTOGRAPHIC PRINTS.

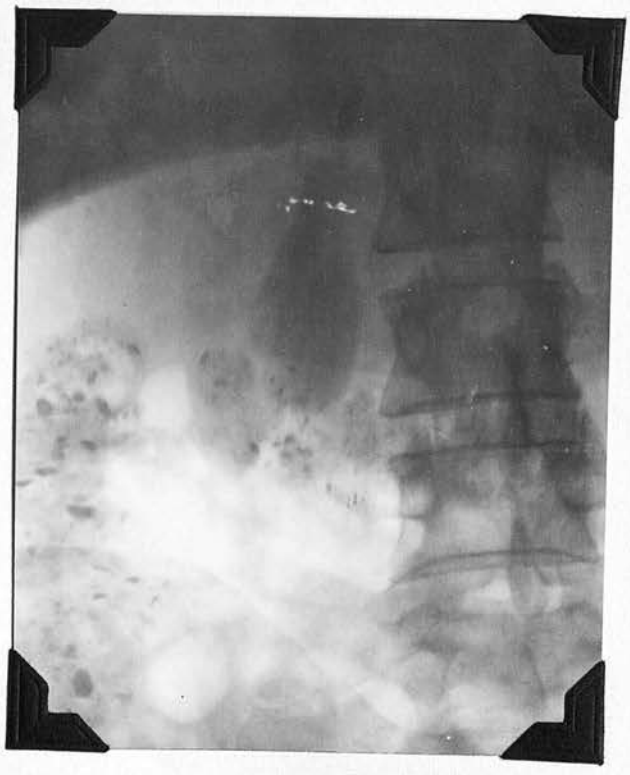
PAGE 1,2 & 3 - NORMAL GALL-BLADDER SHADOWS.

PAGE 4 - GALL-BLADDER FAINTLY OUTLINED AND SHOWING THREE CALCULI.

NORMAL GALL BLADDER SHADOWS.



I5 HOURS AFTER ORAL S.T.I.P.



TWO HOURS AFTER FATTY MEAL.

-40 HOURS AFTER ORAL S.T.I.P.

NORMAL GALL BLADDER SHADOWS.

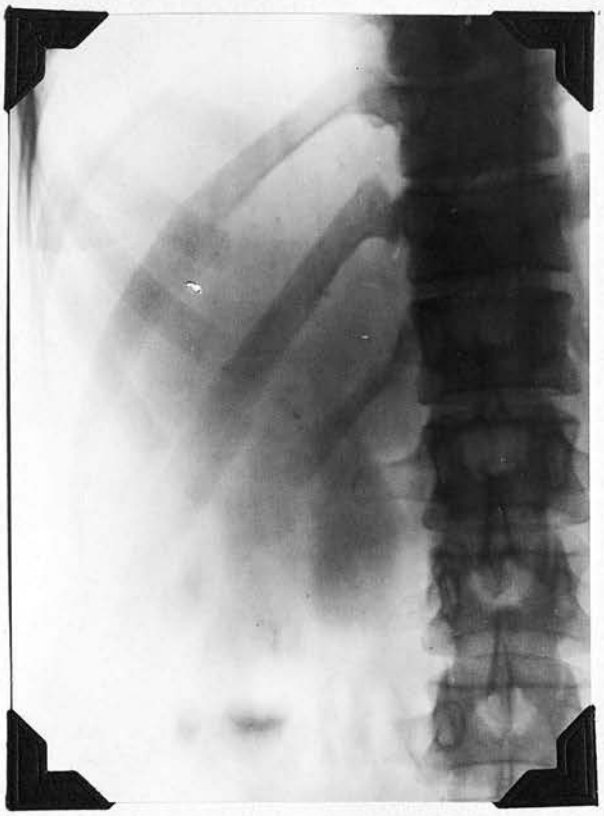
I5 HOURS AFTER ORAL S.T.I.P.

TWO HOURS AFTER FATTY MEAL.

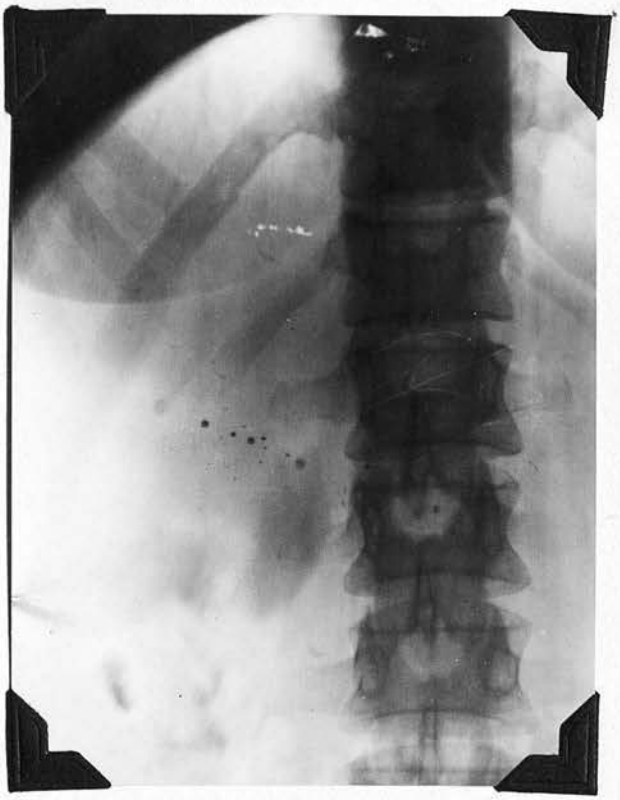
40 HOURS AFTER ORAL S.T.I.P.

3

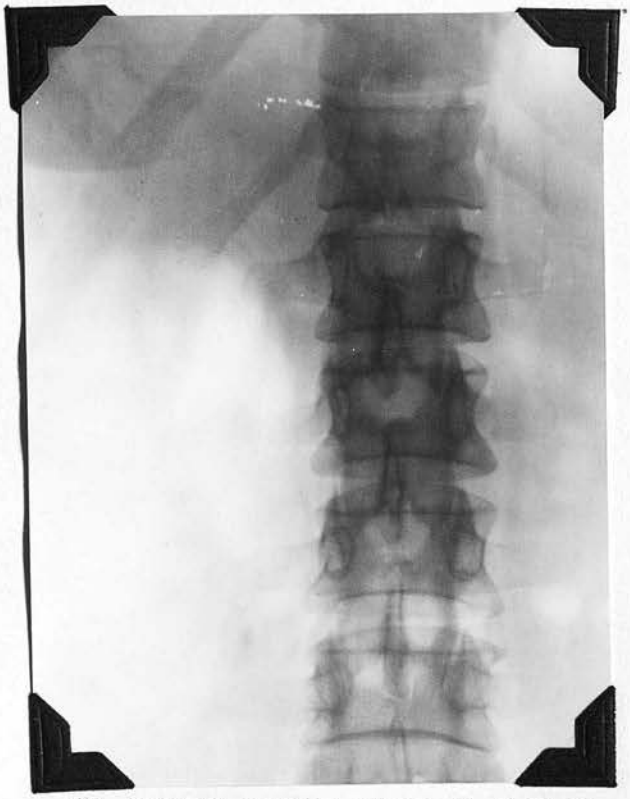
NORMAL GALL BLADDER SHADOWS.



I5 HOURS AFTER ORAL S.T.I.P.



TWO HOURS AFTER FATTY MEAL.



40 HOURS AFTER ORAL S.T.I.P.

GALL BLADDER FAINTLY OUTLINED AND CONTAINING CALCULI.

I5 HOURS AFTER ORAL S.T.I.P.

TWO HOURS AFTER FATTY MEAL.

40 HOURS AFTER ORAL S.T.I.P.


SIZE
11" 8½"

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